Merging the CEM2k and LAQGSM Codes with GEMINI

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During recent years, we have developed at LANL an improved version of the Cascade-Exciton Model (CEM) of nuclear reactions realized in the code CEM2k and the Los Alamos version of the Quark-Gluon String Model (LAQGSM) to describe reactions induced both by particles and nuclei at energies up to hundreds of GeV/nucleon for a number of applications. Originally, both CEM2k and LAQGSM were not able to describe fission reactions and production of light fragments heavier than ^{4}He, as they had neither a high-energy-fission nor a fragmentation model. Recently, we addressed this problem by further improving our codes and by merging them with several evaporation/fission/fragmentation models. Here, we present results of merging CEM2k and LAQGSM with the well-known sequential-binary-decay model GEMINI by Charity. We present some results on proton- and nucleus-induced fragmentation and fission reactions predicted by these extended versions of CEM2k and LAQGSM.

We show that merging CEM2k and LAQGSM with GEMINI allows us to describe many fission and fragmentation reactions in addition to the spallation and evaporation reactions which are already relatively well described. Nevertheless, the current version of GEMINI merged with CEM2k and LAQGSM does not provide a completely satisfactory description of some complex particle spectra, fragment emission, and spallation yields for some reactions, and is not yet a universal tool for applications. Our results show that GEMINI is a powerful approach to describe evaporation/fission/fragmentation reactions and often provides better results in comparison with other modern models, especially for emission of heavy fragments from reactions on medium-heavy nuclei (where most other models simply fail), but it must be further extended and improved in order to properly describe arbitrary reactions.

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